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( दूसरा पुनरीक्षण )

**Methods for Testing tar and  
Bituminous Materials —  
Determination of Equiviscous  
Temperature (E V T)**

( Second Revision )

ICS 75.140

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## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Bitumen, Tar and Related Products Sectional Committee, had been approved by the Petroleum, Coal and Related Product Division Council.

This standard was originally published in 1958 as 'Methods for testing tar and bituminous materials — Determination of equiviscous temperature (EVT)' and first revised in 1978. 'Methods for testing tar and bituminous materials' was originally published as series of 22 standards in the form of a booklet, as listed below:

<i>IS No.</i>	<i>Title</i>
IS 1201 : 2004	Sampling
IS 1202 : 1978	Determination of specific gravity
IS 1203 : 1978	Determination of penetration
IS 1204 : 1978	Determination of residue of specified penetration
IS 1205 : 1978	Determination of softening point
IS 1206 (Part 1) : 1978	Determination of viscosity: Part 1 Industrial viscosity
IS 1206 (Part 2) : 1978	Determination of viscosity: Part 2 Absolute viscosity
IS 1206 (Part 3) : 1978	Determination of viscosity: Part 3 Kinematic viscosity
IS 1207 : 1978	Determination of equiviscous temperature (EVT)
IS 1208 : 1978	Determination of ductility
IS 1209 : 1978	Determination of flash point and fire point
IS 1210 : 1978	Float test
IS 1211 : 1978	Determination of water content dean and stark method
IS 1212 : 1978	Determination of loss on heating
IS 1213 : 1978	Distillation test
IS 1214 : 1978	Determination of matter insoluble in benzene ( <i>withdrawn</i> due to toxic nature of benzene)
IS 1215 : 1978	Determination of matter insoluble in toluene
IS 1216 : 1978	Determination of solubility in carbon disulphide trichloroethylene
IS 1217 : 1978	Determination of mineral matter ash
IS 1218 : 1978	Determination of phenols
IS 1219 : 1978	Determination of naphthalene
IS 1220 : 1978	Determination of volatile matter content

However, the Committee responsible for the formulation of standards in the field of bitumen, tar and related products decided to publish these Indian standards separately for each test so as to make it user friendly.

Accordingly, second revision of the standard, IS 1207 'Methods for testing tar and bituminous materials — Determination of equiviscous temperature (EVT)' was taken up to formulate an individual standard.

In this revision all the amendments issued earlier have been incorporated and technical modifications are not introduced.

The Composition of the Committee responsible for formulation of this standard is given at Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

## Indian Standard

# METHODS FOR TESTING TAR AND BITUMINOUS MATERIALS — DETERMINATION OF EQUIVISCOSUS TEMPERATURE (EVT)

*(Second Revision)*

## 1 SCOPE

This standard covers the method for the determination of equiviscous temperature (EVT) of road tar.

## 2 REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of this draft standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	Title
334 : 2002	Glossary of terms relating to bitumen and tar ( <i>third revision</i> )
460 (Part 1) : 2020	Test sieves — Specification: Part 1 Wire cloth test sieves ( <i>fourth revision</i> )
1206 (Part 1) : 1978	Methods for testing tar and bituminous materials: Determination of viscosity: Part 1 Volumetric flow rate method

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1206 (Part 1) : 1978	Methods for testing tar and bituminous materials: Determination of viscosity: Part 1 Volumetric flow rate method

## 3 TERMINOLOGY

For the purpose of this standard, the following definition and those given in IS 334 shall apply.

**3.1 Equiviscous Temperature** — That temperature in degrees centigrade at which the viscosity of the tar or pitch is 50 seconds as measured by standard tar viscometer specified in IS 1206 (Part 1).

## 4 APPARATUS

The tar viscometer and accessories as specified under **3.1.1** of IS 1206 (Part 1) shall be used.

## 5 PROCEDURE

The viscosity at any specified temperature preferably a multiple of 5 °C shall be determined in the same manner

as specified in Method A: Determination of viscosity of road tars [see IS 1206 (Part 1)] shall be followed.

## 6 CALCULATION

**6.1** Determine the viscosity of the road tar by Method A of IS 1206 (Part 1) using the 10 mm tar cup at the given temperature.

**6.1.1** From the viscosity so determined and the temperature of test, calculate the EVT from Table 1, which shows the corrections to be applied for the temperature of test to give the EVT when the viscosity has been determined using the 10 mm cup.

*Example:* For a tar having a viscosity of 106 seconds at 30 °C, the correction is given in the row against 100 and col 6 as being + 4.3. Therefore, its EVT shall be 34.3 °C.

**6.1.2** If the viscosity obtained is below 33 seconds or above 75 seconds, ascertain the approximate EVT from Table 1. Repeat the determination of the viscosity at the centigrade temperature, nearest to the approximate EVT, which is a multiple of 5. From the viscosity obtained in this repeat determination and the temperature of this test, calculate EVT from Table 1.

**6.1.2.1** The results of repeat determinations on portions of the same tar sample shall fall within  $\pm 0.2$  °C of the average of several readings.

The following example illustrates the procedure when a retest is necessary:

A tar tested at 35 °C is found to have a viscosity of 92 s, which is outside the permissible range of 33 to 75 s. Table 1 gives a correction of + 3.5 °C to be applied, making the EVT approximately 38.5 °C. The determination of the viscosity is, therefore, repeated at the temperature nearest to 38.5 °C which is a multiple of 5 that is at 40 °C. At this temperature the viscosity is found to be 38 seconds. From Table 1, it is found that a correction of -1.7 °C is to be applied to the temperature of test. The EVT is, therefore  $(40 - 1.7) °C = 38.3 °C$ .

## 6.2 Method for Determining True EVT

The EVT determined as described in **5.1** may differ from the true EVT. In the case of tars of EVT at or above

**Table 1 Correction in Centigrade Degrees to be Applied to Temperatures of Test to Give EVT of Tars of Known Viscosity Determined by Using the Specified 10-mm CUP**  
*( Clauses 6.1.1, 6.1.2, 6.1.2.1 and 6.2 )*

VISCOSITY IN SECONDS	0	1	2	3	4	5	6	7	8	9
CORRECTION IN °C										
10	-10.4	-9.8	-9.2	-8.7	-8.2	-7.7	-7.3	-6.9	-6.5	-6.1
20	-5.7	-5.4	-5.1	-4.8	-4.5	-4.3	-4.0	-3.8	-3.5	-3.3
30	-3.1	-2.9	-2.7	-2.5	-2.3	-2.2	-2.0	-1.9	-1.7	-1.5
40	-1.4	-1.2	-1.1	-0.9	-0.8	-0.6	-0.5	-0.4	-0.3	-0.1
50	-0.0	0.1	+0.2	+0.3	+0.5	+0.6	+0.7	+4.8	+0.9	+1.0
60	+1.1	+1.2	+1.3	+1.4	+1.5	+1.6	+1.7	+1.7	+1.8	+1.9
70	+2.0	+2.1	+2.2	+2.2	+2.3	+2.4	+2.5	+2.5	+2.6	+2.7
80	+2.8	+2.8	+2.9	+3.0	+3.0	+3.1	+3.1	+3.2	+3.3	+3.3
90	+3.4	+3.5	+3.5	+3.6	+3.6	+3.7	+3.7	+3.8	+3.9	+3.9
100	+4.0	+4.0	+4.1	+4.1	+4.2	+4.2	+4.3	+4.3	+4.4	+4.4
110	+4.5	+4.6	+4.6	+4.7	+4.7	+4.8	+4.8	+4.9	+4.9	+5.0
120	+5.0	+5.1	+5.1	+5.2	+5.2	+5.2	+5.3	+5.3	+5.4	+5.4
130	+5.5	+5.5	+5.5	+5.6	+5.6	+5.7	+5.7	+5.7	+5.8	+5.8
140	+5.9	+5.9	+6.0	+6.0	+6.0	+6.1	+6.1	+6.1	+6.2	+6.2

17.5 °C, the EVT determined according to the method described may differ from the true EVT by an amount in general not exceeding 10 percent of the difference between the temperature of test and the EVT. If it is required to know the true EVT, the viscosity shall be determined at two temperatures, differing by at least 5 °C but not more than 10 °C and such that the viscosities are within the range of 25 to 100 seconds. The value of the EVT is calculated for each temperature of test by reference to Table 1. If the two values are not identical, the true EVT shall be calculated by means of the following formula:

$$\text{True EVT} = T_1 - \frac{d_1}{d_2 - d_1} \times (T_2 - T_1)$$

where

$T_1$  and  $T_2$  = values of the EVT calculated from the two test temperatures; and  
 $d_1$  and  $d_2$  = respective corrections applied to the temperatures of test to give the EVT.

Care shall be taken with the signs for  $d_1$  and  $d_2$ ; if the temperature of the test be above the EVT, the correction shall be negative. If the same value be obtained, it represents the true EVT.

### 6.3 Approximate Relationship Between EVT and Viscosity

**6.3.1** The EVT-Viscosity chart (see Fig. 1) shows the approximate relationship ranging between EVT and viscosity at various temperatures from 20 to 60 °C. To obtain from a given EVT the equivalent viscosity in seconds at anyone of the test temperatures shown, a straight-edge shall be laid at right angles across the scale and the reading made on the appropriate viscosity scale.

**6.3.2** Since viscosities within 10 to 140 s only may legitimately be determined on the tar viscometer described in Method A of IS 1206 (Part 1) figures outside these limits given in the chart are meant to be used for the purpose of rough comparison and not for accurate evaluation.

### 7 REPORT

The report of the EVT shall be the temperature in degrees centigrade at which the viscosity is 50 s as measured by the standard tar viscometer.

### 8 PRECISION

The EVT determination made by different operators should not differ by more than the following:

Repeatability	Reproducibility
0.4 °C	0.7 °C

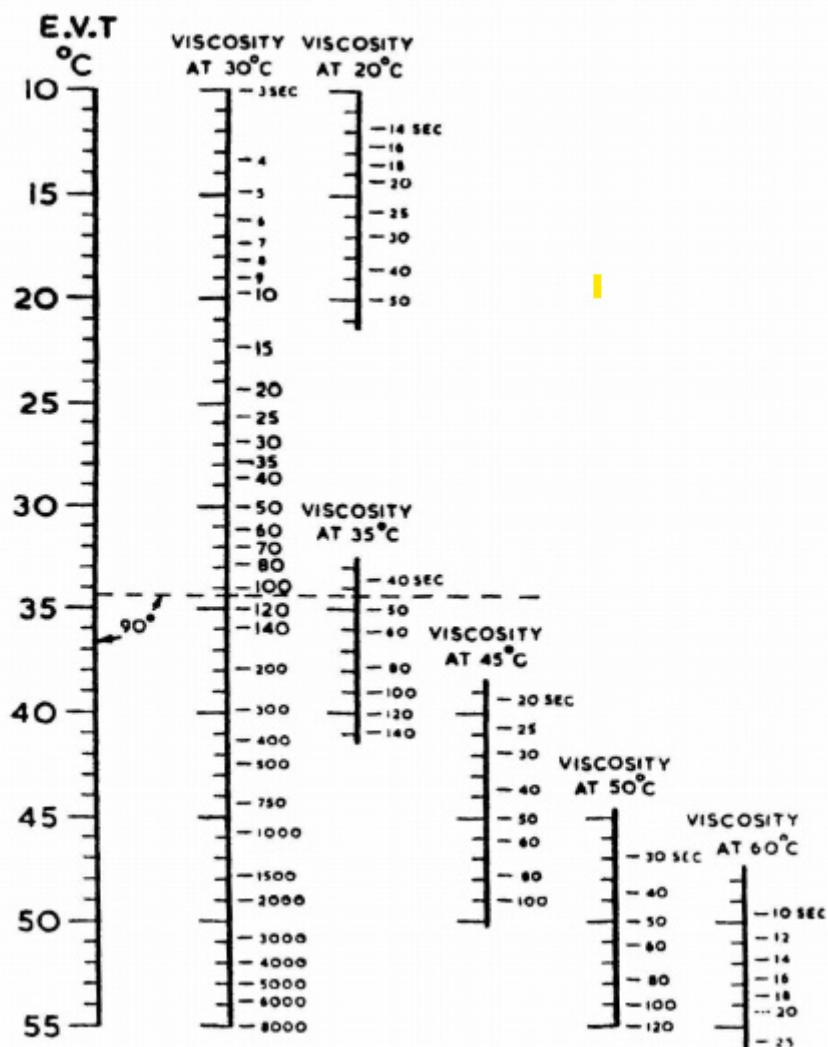


FIG. 1 EVT-VISCOSITY RELATIONSHIP CHART

## ANNEX A

(Foreword)

## COMMITTEE COMPOSITION

Bitumen, Tar and Related Products Sectional Committee, PCD 06

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### **Amendments Issued Since Publication**

<b>Amend No.</b>	<b>Date of Issue</b>	<b>Text Affected</b>

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